



# Biochemistry

University of Missouri

## Graduate Student Handbook

### University of Missouri-Columbia

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# Ph.D. Degree

## Prerequisites

- Biochemistry At least one lecture course and one laboratory course, equivalent to Biochem 4270 or 4272 and 4974.
- Biological Sciences One semester (e.g. general or microbiology)
- Physics One year, equivalent to Physics 1210 and 1220.
- Organic Chemistry One year with laboratory, equivalent to Chemistry 2100, 2110, 2130
- Calculus One year, equivalent to Math 1500 and 1700.

## Highly recommended courses

- Genetics or Molecular Biology One semester, equivalent to Biology 2200 or 4976
- Biochemistry Second semester of a lecture course, equivalent to Biochem 4272
- Quantitative Analytical Chemistry One semester, equivalent to Chemistry 3200.
- Physical Chemistry One semester of a course with a calculus prerequisite, equivalent to Biochem 4300 or Chemistry 3300.

A limited number of the courses listed above may be completed after acceptance as a graduate student. Any deficiencies must be completed in the first year of the graduate program. For example, it is recommended that students who have not completed a physical chemistry course take Biochem 4300, Physical Biochemistry, during the Fall semester of the first year.

## Graduate Record Examination

The general examination is required and an advanced test is recommended.

## TOEFL Exam

Students whose first language is other than English must take the TOEFL exam and score at least 620 on the paper version, 260 on the computer version, or 90 on the new version of the exam.

## Research Rotations

To acquaint students with research laboratory settings, all incoming students participate in at least three research rotations during the first academic year. The purposes of rotations for the student include learning about laboratories of potential thesis advisors and exploring new areas of science. Thus, rotations in very different focus areas are highly recommended.

Each rotation is exactly eight weeks. Two rotations are performed in the first semester with the second rotation ending the Friday that classes end. The third rotation begins on the Monday two weeks before the Monday of Martin Luther King Day. For each of these two semesters, the student should register for 2 sections of one hour (each) Biochem 8450 (non-thesis research). Students should not register for more than 2 credits of Biochem 8450 in any one semester. The laboratory for the first rotation is determined during orientation week by discussion between the student, faculty and the Director of Graduate Studies (DGS). Second and third rotations are decided later in the semester after the student has had time to learn

about faculty members and their research, but at least one week before the end of the previous rotation. All rotations are chosen via discussions between the student and the faculty member and must be approved by the DGS. The faculty in whose laboratory the rotations are carried out will evaluate the student's performance and recommend letter grades for Biochem 8450. ***Faculty and students will provide the GEC with short written description and evaluation of the rotation within one week after the end of the rotation. Assessment of the student's performance is reflected in the assignment of grades (Biochem 8450 requires A, B, or C grading)***

During a rotation, the student should perform as a full member of the laboratory. The student should have a desk and laboratory bench and a defined project supervised and guided by a member of the laboratory. One-half of the student's time and effort should be directed toward the rotation project, the other half toward course work. Since successful scientists usually work much more than 40 hours a week, the time of actual effort is typically greater. It is essential that you adopt a realistic work schedule that will allow you to complete your course work and perform laboratory research. The rotation laboratory should serve as an academic home and the student should participate in all usual laboratory activities, particularly weekly group meetings. The student should present an oral report about the research pursued to the host laboratory at the end of the rotation period. All members of the GEC are available for consultation at any time, should a difficult or awkward situation arise for anyone involved

### **Summer Research Opportunity**

Students are welcome to matriculate at the beginning of the summer term. A graduate student starting then will pursue full-time research for at least ten weeks that summer with a Biochemistry faculty member agreeing to supervise the research. The student will enroll in 4 credit hours of Biochem 8090 under the mentor and performance in the lab is reflected in an assigned grade (S/U); this does not qualify as a rotation. The student will still be required to do three laboratory rotations with the first starting at the beginning of their first semester. Students may return to the laboratory of their summer research experience for one of the three rotations.

### **Selection of Thesis Advisers**

At the end of the third rotation students should identify a thesis advisor from the group of doctoral faculty having financial support for students. The choice of advisor is subject to final approval by the faculty member, the Director of Graduate Studies, GEC, and the department Chair. The student will receive credit and have a grade assigned for the fourth hour of Biochem 8450 by the advisor, reflecting the work performed with the thesis advisor during the second half of the second semester.

### **Coursework**

#### *Thesis Research (Biochem 9090)*

Prior to successfully completing the Comprehensive Examination, nine credit hours per semester or four credit hours per summer are required to remain a full-time graduate student. If required classes do not total nine credit hours, Biochem 9090 should be used to reach the total. Following successful completion of the entire Comprehensive Exam, students should register for a minimum of two hours of thesis research (Biochem 9090) per semester (one in summer) to maintain "continuous enrollment." Students may need more than the minimum number of credit hours per semester to obtain the 72 credit hours required by the Graduate

School for completion of the Ph.D. You must be registered every semester prior to and including the semester in which you defend your dissertation. Zero-credit options are available; see the DGS.

### *Required Courses*

During the first semester Ph.D. students are expected to complete the Introductory Graduate Biochemistry I [5 hrs, Biochem 8240 (Macromolecular Structure & Function, 4hrs) and Biochem 9085 – section 4 (1 hr)]. Students must earn a B or A in each course. A C is unsatisfactory and the student must retake the course(s). A required course must be completed with a grade of B or better in order to remain a Ph.D. student in good standing. Only students in good standing may take the Qualifying exam. A grade of F in the required courses will result in dismissal from the graduate program in Biochemistry, for lack of making "satisfactory progress". A student who has been dismissed has the right to appeal the dismissal to the department and Graduate Faculty Senate. Details on procedures for appeal to the department and Graduate Faculty Senate can be found at:

<http://gradstudies.missouri.edu/academics/progress/requests-for-extensions-appeals.php>

### *Required additional Elective Coursework*

A Ph.D. student must take a minimum of 10 additional hours of graduate science courses at the 8000 or 9000 level, and must earn a grade of B or better. Courses can be suggested or be required by the student's doctoral program committee. To satisfy the need for electives, students are encouraged to enroll in any of the following "pre-approved" Biochemistry courses towards their required 9 hours: Biochem 8260 [Systems Biology-Methodology (2-4 hrs)], Molecular Biology II [Biochem 9432 (4 hrs)], Enzymology and Metabolic Metabolism [Biochem 8432 (3 hrs)], Signaling in Molecular Cell Biology [Biochem (3 hrs)] and Structural Biology and Molecular Association [Biochem 9001 (2 hrs)]. Other Graduate level sciences courses may complete this requirement; please submit individual requests for approval by the GEC before enrolling.

### *Ethics Seminar*

Ethical Conduct of Research [Biochem 8060 (1hr)], (or the equivalent offered in another department) is required of all Biochemistry graduate students. We recommend you complete this in your second semester (only offered in Spring).

### *Seminar [Biochem 9087 (4 credits total)]*

Students should enroll in Biochem 9087 during their first semester. Biochem 9087 in the Fall semester is designed to teach the fundamental techniques of oral presentation of scientific information, slide preparation, computer graphics, overhead preparation, etc. In addition, research compliance training (Chemical safety, Radiation safety) will be provided.

Students should take three additional semesters of Biochem 9087 in Spring semesters of years 3, 4, and 5. (A student may ask the DGS for permission to take 9087 in year 2 but this is not typical). In year 3, a student's second 9087 seminar is devoted to a presentation of their research. The third seminar should provide an update of research progress or a review of major journal papers in the student's research area. The fourth and final Biochem 9087 should be a practice for the dissertation defense. The student's thesis committee (Doctoral Program Committee, DPC) is expected to attend each of these presentations at the specific invitation of the student. A meeting with the DPC can often be conveniently arranged after the seminar presentation and serve as the required annual meeting.

### *Department Seminars*

***Students are required to attend all departmental seminars*** which are currently held Fridays at 1 pm in the Monsanto Auditorium of the Life Sciences Center.

### *Credit Hours*

The Graduate School requires a minimum of 15 credit hours of course work at the 8000-level or higher (exclusive of research, problems and independent study experiences). The aforementioned core course work will fulfill 15 hours or more of this requirement. Ethics and Biochem 9087 (seminar) do not count towards the 15 credits. The student and his/her advisor in consultation with the student's DPC may decide upon additional courses. A minimum of 72 semester hours beyond the baccalaureate degree is required for the Ph.D. Within any limits imposed by the Graduate School or DPC, additional classroom graduate credit hours can apply to the requirement of 72 credit hours.

### *Residency*

At least two nine-hour or three six-hour semesters must be completed in an 18-month period at MU to satisfy the residency requirement. All courses taken to satisfy the residency requirement must be MU courses approved for graduate credit and approved by the student's DPC.

### *Minimum Enrollment and Continuous Registration*

Graduate students must maintain full-time status until they have passed both portions of the Comprehensive Exam. Full-time status is achieved by enrolling for 9 hours in Fall and Spring semesters and 4 hours during Summer term; students typically enroll in Biochem 9090 Research in order to complete their required hours. Students are responsible for signing up for the appropriate number of credits each semester. Late fees will be charged to student's accounts.

Completion of the Comprehensive Exam admits a student to candidacy for the Ph.D. After the Comprehensive Exam has been passed, students must maintain continuous enrollment by registering in Biochem 9090 for at least 2 credit hours in Fall and Spring semesters and 1 credit hour in the summer. However, in order to meet the requirement for 72 hours of post-baccalaureate credit required by the Graduate School, students may need to enroll for up to 9 hours of Biochem 9090 per term to accumulate the 72 hours. Students may enroll in other courses in addition to 9090 and reduce the total 9090 hours taken, with approval of their Advisor. Failure to enroll in any semester terminates PhD candidacy by the Graduate School. Students entering their 6<sup>th</sup> year without a defense date planned will be required to meet with the GEC twice a year until graduated.

## **Financial Support**

All Ph.D. candidates are provided with a graduate research assistantship from departmental or institutional sources for a maximum of twelve months of study. (As the University fiscal status changes, the departmental support may also be altered.) Special University and extramural fellowships may be used to supplement or extend this award. Laboratory rotations and the majority of the course work should be completed while students are supported by departmental sources. After departmental support, students will be supported by research grants, fellowships or other sources available to their mentors. A statement of employment agreement will be signed yearly.

## Graduate Statement of Employment

I understand that I am obligated to be an enrolled graduate student each semester when employed as a Graduate Research Assistant at the University of Missouri. I understand that this entails attending and maintaining satisfactory performance in my classes. I understand that absences of more than 2 days during the semester require written notification to the course directors and that further absence beyond this due to illness may require a written excuse from a physician. I understand that failure to meet these conditions is a breach of my conditions of employment and, in the case of international students, may affect visa status.

I am obligated to fulfill my duties as a research assistant, which includes regular attendance and work in my research laboratory, including during first-year laboratory rotations. Absences from a regular work schedule (excluding University holidays) must be discussed with and approved by my research or rotation advisor. I am obligated to fulfill the duties my supervisor assigns and I understand that continuing my assistantship is dependent on fulfilling those duties, my performance reviews, and the availability of funding.

I understand I must discuss additional employment at the University of Missouri with Dr. Charlotte Phillips, Director of Graduate Studies and my mentor before accepting any other part-time employment. I also understand that I may not exceed a yearly average of 0.70 FTE and remain in a student title with all the benefits associated with that title.

I also agree at all times to adhere to university standards of professional behavior, and will abide by the university standard of conduct as defined in the Collected Rules and Regulations 200.010, Chapter 200: Student Conduct.

[https://www.umsystem.edu/ums/rules/collected\\_rules/programs/ch200/200.010\\_standard\\_of\\_conduct](https://www.umsystem.edu/ums/rules/collected_rules/programs/ch200/200.010_standard_of_conduct)

I accept these conditions and the assistantship offer.

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*Graduate Signature*

*Date*

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*Chairman of Biochemistry*

*Director of Graduate Studies*

## **Fee and Fee Remission Program**

Non-resident tuition and the resident education fees are waived. Student Activities Fees are paid by the student.

## **Doctoral Program Committee (DPC)**

The DPC membership is selected by the student's advisor in consultation with the student by the end of the second semester. In cases where matching of student with advisor is delayed, the DPC should be selected before one year has elapsed following the student's matriculation.

The DPC shall be composed of a minimum of four members of the MU graduate faculty. The DPC will include at least three members from Biochemistry faculty and an outside member from a different MU program. At least two of the DPC members besides the advisor must be MU doctoral faculty. Additional committee members with specialized expertise who do not meet the criteria for the MU graduate faculty or doctoral faculty may serve on a doctoral committee as a fifth or sixth member, with special permission of the GEC and Dean of the Graduate School. This committee will be responsible for 1) the composition, administration, and evaluation of the Qualifying Examination, 2) advising the student throughout graduate study, 3) evaluation of the written and oral portions of the Comprehensive Examination, and 4) evaluation of the dissertation and the final defense.

## **First Doctoral Committee Meeting**

The first meeting between the graduate student and his/her Doctoral Program Committee (DPC) should occur as soon as possible after the student has identified a mentor and by the end of the summer after the first academic year in order to fulfill Graduate School requirements for completing the D-1 and D-2 forms [Committee members, and Plan of Study] within the first year.

*The purposes of this meeting are to introduce the scientific interests and goals of the student to the committee, to determine criteria for the Qualifier Examination, and to identify the Plan of Study.*

## **Qualifying Examination**

The purposes of the Qualifying Examination (QE) are to evaluate the student's potential to successfully progress towards his/her degree, to evaluate the student's foundational knowledge, and to identify areas that need to be strengthened. The QE shall assess the student's foundational knowledge, including knowledge of proteins and enzymes, metabolism, nucleic acids and gene expression, and supramolecular structure and gene expression. The decision of the timing and format of the QE is at the discretion of the student's DPC. However, the QE should be completed before the end of the fall semester (December) of their second year. The format can be oral or written. The criteria and format of the QE component can range from basic questioning of the student, including specific assessments in the context of the student's research interests or as extensive as providing a student in advance with a formalized set of specific foundational concepts or topics and evaluating the student orally or in a written format.

The Director of Graduate Studies (DGS) is to be notified once the student, student's advisor, and their DPC have agreed upon the criteria, format and date of the QE. A member of the GEC will be assigned to be present at the QE as a non-voting member to assure uniformity among committees and to report outcomes to the GEC.

As with all meetings between the student and the Doctoral Program Committee, the student

should prepare a brief written document in advance of the meeting that summarizes the topics to be discussed. This document should be distributed to the committee members at least one week in advance of the meeting.

For the first committee meeting, the written document should describe the student's "Plan of Study" and consist of two parts, the formal coursework to be taken by the student and the research project(s) to be undertaken by the student.

For the Plan of Study, the student should provide 1) a list of graduate level coursework that has been completed to date, along with the grades received, and 2) a list of proposed courses and indicate how the formal course requirements of both the Department and the Graduate School will be met. The committee will review the completed and proposed coursework and, if necessary, suggest different or additional courses for the student consistent with the research interests of the student.

The second part of the document is a brief one- to three-page description of a projected Ph.D. research direction. At the first committee meeting, the student should describe this orally, including relevant scientific background. The committee will provide suggestions about the research direction.

At this meeting the Plan of Study / D-2 form should be completed <https://gradstudies.missouri.edu/policy/doctoral-plan-of-study/>. The form is available on the Graduate School website: <https://gradstudies.missouri.edu/wp-content/uploads/2018/03/d2.pdf>

## **Teaching Experience**

An important part of graduate education is learning to communicate effectively as a teacher.

One semester of teaching experience is a required component of both the M.S. and Ph.D. degrees. This requirement is typically performed in the second year of graduate study, although the Director of Graduate Studies may change this time frame to accommodate special circumstances. To facilitate the teaching experience students should enroll in Biochem 9001 (3 hrs) in semester of year 2 that they are assigned to teach. The teaching experience is a combination of discussion sessions with a coordinating faculty member as well as the classroom experience with students. The latter usually involves assisting a faculty member in an undergraduate level course including (but not limited to) Biochem 4270 and Biochem 4272 and possible opportunities in Biochem 4974 /7274 (capstone laboratory course for senior majors).

Up to three hours of graduate level-course credit will be earned for this semester-long teaching experience (this does not count toward the 15 hours of class required but does count toward the 72 for graduation). In a semester the student is teaching, they should register for 3 credits in the 9001\*3 course. Student TA's work in conjunction with a faculty who is instructor in an undergrad-level course. The faculty of the course will recommend a letter grade (A, B, C or F based on performance) to the DGS and provide the TA descriptive written feedback on a quarterly basis and a mid-semester, preliminary grade report. Students must satisfy this teaching requirement with a grade of "B" or better to remain in good standing as a graduate student in Biochemistry. The TA assignment and associated recitation meeting times have priority; any potentially conflicting classes the student is interested in can be taken in a future semester.

The University provides training to help students prepare for teaching and to expand their oral proficiency. All students (international or native English speakers) must participate in all of the Teaching Assistant (TA) orientation and training offered by the Biochemistry Department (as part of 9001\*3) and by MU (GATO, ONITA and/or WI courses) before the semester they are teaching begins, as partial fulfillment of the departmental teaching requirement.

Missouri requires that students whose first language is not English must demonstrate adequate oral proficiency before they can assist in teaching. Proficiency is demonstrated by passing the University oral proficiency examination, currently called the SPEAK test. A student must score 2 or better on the SPEAK test in order to qualify to serve as teaching assistant. *Failure to pass the oral proficiency examination by the end of the first year following matriculation may result in termination from the graduate program.* Students with poor oral proficiency, as evidenced by a score of '1' on the exam, may be required to enroll in a University English course.

### **Minor in College Teaching**

For graduate students who are particularly interested in teaching as a career and wish to gain additional teaching experience, the University of Missouri (Office of Graduate Studies) also offers a Minor in College Teaching ([https://gradstudies.missouri.edu/professional\\_development/minor-in-college-teaching-program/](https://gradstudies.missouri.edu/professional_development/minor-in-college-teaching-program/)).

### **Comprehensive Exam**

The Comprehensive Exam must be completed during the two semesters following a satisfactory performance of the Qualifier Exam and in any case no later than five semesters following matriculation. Failure to complete the exam on time will result in a mandatory meeting of the student and advisor with the GEC and may result in the student's dismissal from the Ph.D. Program. Comprehensive exams at the University of Missouri have both written and oral components that are evaluated independently. ***In the Department of Biochemistry, the written component is a research proposal. The oral component is the oral defense of the proposal and responses to questioning by the thesis committee with one GEC member present.***

Students submit a written proposal in the current format of an NIH postdoctoral fellowship grant proposal to their faculty advisor for approval before submitting to their committee. After the advisor indicates the document is appropriate for consideration a hard copy must be given to each member of the DPC and the Director of Graduate Studies (DGS) a minimum of two weeks in advance of the exam. Within one week before the exam, any member of the student's DPC that does not find the document acceptable should contact the student, allowing the student time to revise the oral presentation accordingly or consider rescheduling the exam.

The format of an NIH postdoctoral fellowship is explained in the subsection on Format below. Sufficient information must be incorporated into the written proposal for the committee to make an evaluation of the proposed research plan. Although the advisor is expected to provide information, input and ultimately judge the document appropriate for consideration before it is distributed to the DPC, the student should independently write the proposal, develop the rationale for the design of experimental approaches and be prepared to defend it. The proposal does not represent a contract for research but is a description of a logical series of experiments designed to contribute to the body of scientific knowledge in a given

discipline. It does not need to be limited to resources available to the faculty advisor but needs to be scientifically sound.

The voting members of the examination committee for the Comprehensive Exam will consist of the student's DPC (minus the advisor) with a member of the GEC serving as a non-voting chair of the Exam committee. While the advisor is expected to be present at the examination, he/she will not participate in the exam and cannot interject opinions or explanations. The advisor may voice an opinion or explanation after the student has finished the exam during discussion prior to the committee's vote.

For the comprehensive examination to be successfully completed, at least 3/4 of the examination committee must vote to pass the student; one dissenting vote is a "pass". If circumstances warrant, the student may be given a "conditional pass" and will be allowed to retake or clarify portions of the written portion of the examination to demonstrate the expected level of comprehension. If a non-pass is decided, the committee may recommend further written work or remedial measures. The student who does not pass may re-write the entire proposal and undergo a second examination after at least 12 weeks have lapsed (as required by the Graduate School). Less than full committee approval on the second attempt may result in the student being dismissed or transferred to the M.S. program. In the latter event, readmission to the Ph.D. program requires the support and agreement of the GEC.

The oral defense of the written portion is the last part of the Comprehensive Examination. When both portions are successfully completed, *the Biochemistry Department's version of the D-3 should be completed, signed by the exam committee, the DGS and forwarded to the Graduate School.* <http://www.biochem.missouri.edu/docs/biochem-d3.pdf>

## Format

The required format of the Comprehensive proposal is detailed in this excerpt from the current NIH PHS416-1 postdoctoral fellowship instructions. The Biochemistry Department at MU, however, has interests well beyond the public health mission of NIH.

### ***Research Proposal Description: Project Summary***

The *Project Summary* is meant to serve as a succinct ( $\leq 30$  mins) and accurate description of the proposed work. State the application's broad, long-term objectives and specific aims, making reference to public benefits of the project. Describe concisely the research design and methods for achieving the stated goals. This section should be informative to other persons working in the same or related fields and insofar as possible understandable to a scientifically or technically literate reader. Avoid describing past accomplishments and the use of the first person. Total exam period should be 2 hrs.

*Following sections A through D are limited to 10 pages.*

#### **A. Specific Aims**

List the broad, long-term objectives and the goal of the specific research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

#### **B. Background and Significance**

Briefly sketch the background leading to the present application, critically evaluate existing knowledge, and specifically identify the gaps that the project is intended to fill. State concisely the importance and public relevance, to health or agriculture for example, of the research described in this application by relating the specific aims to broad, long-term objectives.

### **C. Preliminary Studies**

Use this section to provide a succinct account of preliminary studies that are pertinent to the proposal. When available, preliminary results can help your doctoral program committee to evaluate your preparedness and capability to conduct PhD research but such results are not required or necessary.

### **D. Research Design and Methods**

Describe the research design, conceptual framework, procedures and analyses to be used to accomplish the specific aims of the project. Include how the data will be collected, analyzed, and interpreted. Describe new methodology and its advantage over existing methodologies. Describe novel concepts, approaches, tools, or technologies to be used. Discuss potential difficulties and limitations of the proposed procedures and alternative approaches to achieve the aims. As part of this section, provide a tentative sequence or timetable for the project.

### **Literature Cited**

This section does not contribute to the page limit. List all literature references. Each must include the title, names of all authors, book or journal, volume number, page numbers, and year of publication. References should be limited to relevant and current literature. While there is no page limitation, be concise and select only those references pertinent to the proposed research.

## **Evaluation of Comprehensive Proposal**

For the preparation of the proposal, the students are encouraged to use all the resources at hand including faculty and other students. Advisors should use the preparation of this proposal as an opportunity to mentor the student in the science proposed and in the formulation of a proposal. Detailed editing and exact outlining of the experiments are the responsibility of the student. The student will be evaluated on 1) writing skills, 2) deductive thinking, 3) inductive reasoning, 4) experimental design, and 5) knowledge of relevant literature, recent and past.

The proposal should be well organized, clearly written and logically presented. However, the ideas incorporated should form the basis for additional questioning to determine whether the student can identify significant biochemical questions related to his/her work and devise a logical experimental plan to address the issues. An understanding of basic biochemical principles should be demonstrated. The oral defense should likewise be delivered clearly and logically. Responses to questioning should be professional and appropriate for both particular issues of the research project and broader knowledge of biochemistry.

## **Standards of Academic Performance**

Doctoral students must maintain an acceptable level of academic performance in order to remain in the program. When a student's GPA falls below 3.0, receives more than 2 C's in graduate courses, or spends two consecutive semesters on academic probation, he/she will be notified in writing that his/her performance is not satisfactory. Even if this is not the case, a student's DPC and/or advisor may decide that a student's research performance is not

satisfactory. Unsatisfactory performance can result in dismissal from the PhD program. Students may elect to apply to the GEC to change to the M.S. program. Decisions regarding a student's standing in the Department are made by the GEC and can be appealed to the Department Chair, and then to the Graduate Faculty Senate Committee on Graduate Student Appeals.

### **Departmental Ombudsman**

The position of "Ombudsman" originated in Scandinavian society. Note that in Swedish and other Scandinavian languages, the word "man" is without gender and equivalent to the English "one", as in "One should be diplomatic in these situations". In many Scandinavian organizations, whether political, commercial or academic, there is an ombudsman who serves as an unbiased and confidential listener, gives advice and can take action if an individual so desires. An ombudsman can provide receptive channel for discussing difficult and awkward situations, council in times of tension or conflict, and effective action to resolve potentially volatile situations.

In the Department of Biochemistry, Dr. Linda Randall serves as Departmental Ombudsman. As part of her departmental service activities, she is available for confidential consultation and advice to all departmental personnel, students, staff members and faculty members about situations related to the Department or departmental personnel. She has many years of experience in this role, and been of substantial help in a range of difficult situations. Dr. Randall will not discuss issues brought to her as Ombudsman with anyone else or take any action unless the concerned individual approves.

You should be aware that Dr. Randall has a particular empathy with students, because she continues to work intensively in the laboratory, doing experiments constantly. Thus she is fully aware of the challenges of day-to-day experimentation and of life in a laboratory. For this reason, you should not hesitate to talk with her if you find yourself in need of a sympathetic ear and of unbiased and knowledgeable advice.

### **Dissertation Defense**

Upon completion of dissertation research, and with the approval of his/her advisor and DPC, the student will prepare a thesis. He/she should adhere to the Graduate School Guidelines for thesis preparation (<http://gradstudies.missouri.edu/academics/thesis-dissertation/dissertation-process.php>).

Thesis defense involves a public research seminar followed by a closed meeting of the candidate with his/her DPC. Upon examination of the thesis and thesis research, the committee will vote to accept or reject the thesis. Submission of the final thesis to the Graduate School will be electronic. The D4 form must be completed and signed by all committee members.

### **Dissertation Preparation and Submission**

The GEC of the Biochemistry Department recommends the following guidelines for preparation of dissertations and thesis:

- The standard requirements of the Graduate School at the website: <http://gradstudies.missouri.edu/academics/thesis-dissertation/diss-thesis-guideline/>
- The Style Manual published by the Council of Biology Editors, Inc. for questions of punctuation, capitalization, and other matters of general style.

- The format of the *Journal of Biological Chemistry* (or the premier journal in the discipline of the research) for references with the full title and inclusive page numbers of the articles.
- All other matters of style to be at the discretion of the dissertation director.

These guidelines are intended to allow flexibility so that the dissertation research can be readily assimilated into publishable form.

### **Forms**

The student is responsible for acquiring and filing the proper forms for submission to the Graduate Studies during the course of the program. These forms (D1 through D4) are available from Graduate Studies, 210 Jesse Hall, and on the Graduate Studies website:

<http://gradstudies.missouri.edu/academics/process/doctoral-process/> and links above.

Please use Biochemistry's modified version of the D3 form -

<http://www.biochem.missouri.edu/docs/biochem-d3.pdf>

**Timetable for students pursuing a Ph.D. starting in Fall 2018:**

<b><u>Date / Semester</u></b>	<b><u>Courses / Forms</u></b>
Week of Aug 13 <sup>th</sup>	Welcome week & planned events – register for classes & identify 1 <sup>st</sup> rotation
Aug. 19 <sup>th</sup>	Last day to register for fall courses without a late penalty
Aug. 20 <sup>th</sup>	First day of class – should be registered for: *Graduate Biochemistry I (8240) (4h) – Macromole Struc & Function *Graduate Biochemistry (9085 – section 4) (1 cr hr) *Seminar 9087 (1h) *Research Rotations 8450 (2x 1 hour each) – Lab Rotations #1 & #2 Biochemistry 9085 – section 4 (1 cr hr) If no previous P-Chem, then recommend Physical Biochemistry 4300 <i>Additional Research credit for non-life science fellowship recipients Biochemistry 9090 (1hr) –to make 9hrs</i>
Oct., 2017	SPEAK test for international students (or Dec. 5, before finals, less optimal)
Oct. 15 <sup>th</sup>	Begin second rotation
Dec. 2018	Submit rotation reviews (to DGS)
Jan. 2019	MEET WITH GEC! – Jan 3-4, 2019. All students must return to Columbia by 1/3/2019 for GEC meetings.
Jan. 12, 2019	Last day to register for Spring courses without a late penalty
Jan. 16, 2019	First day of class- should be registered for: Ethical Conduct of Research (BCH 8060) (1h) *Research Rotation BCH 8450 (2 X 1 hour) -- Rotation #3 and home lab (or #4) Other approved 8000-level science elective with permission: Graduate Biochemistry II (BCH 8260) (4h) [BCH 9001: Methods in Structural Biochemistry and Biophysics] [BCH 9001: Modern Analytical Biochemistry] Molecular Biology II (9432, 4h) Signaling in Molecular Biology 8434 (3 h) (other classes with GEC permission before registering) <i>Choose adviser by March 15 or identify 4<sup>th</sup> rotation.</i> Choose members of Doctoral Program Committee (DPC)
April – Aug '19	Convene your DPC – plan for Qualifying Exam. <a href="#">D-1 form</a> , <a href="#">D-2 form</a>
Summer 2019	*Thesis Research (9090; 4h)
August 2019	* T.A. Training (ONITA or GATO) (register and attend relevant MU training)
Fall 2019	8000+-elective in biochemistry / approved science.
Dec. 2019	Submit Individual Developmental Plan <a href="https://gradstudies.missouri.edu/professional-development/individual-development-plan-idp/">https://gradstudies.missouri.edu/professional-development/individual-development-plan-idp/</a>
January 2020	MEET WITH GEC!
Spring 2020	Ethical Conduct of Research (8060, 1h) if not yet completed. Teaching experience if not completed 8000-level biochemistry or science elective such as Molecular Biology II (9432) <u>Comprehensive Exam</u> completed by Summer 2020 <a href="#">D3 form</a>
Summer 2020	*Thesis Research (9090; 4h if not yet passed Comps or ≥ 1h if passed Comps)
Fall 2020	*Thesis Research (9090; total 2h if passed Comps or 9h if not yet passed Comps)
Spring 2021, '22, '23	Seminar 9087 (1h)
Annual meeting required with DPC by Spring semester end, update Individual Developmental Plans <a href="https://gradstudies.missouri.edu/professional-development/individual-development-plan-idp/">https://gradstudies.missouri.edu/professional-development/individual-development-plan-idp/</a>	

**DEFENSE!**

[D-4 form](#)

\*Required courses & the number of BCH 9090 research credit hours = total number of credit hours

## Appendix A

### Department of Biochemistry

### University of Missouri

#### ACADEMIC AND PROFESSIONAL HONESTY

The University of Missouri Graduate School states:

Academic honesty is essential to the intellectual life of the University. Students who use, or attempt to use as their own the answers, words, ideas or research findings of another person are guilty of academic dishonesty. In addition to such acts of cheating or plagiarism, any unauthorized possession of examinations, hiding of source materials, or tampering with grade records are acts of academic dishonesty specifically forbidden by University rules.

According to the MU Faculty Handbook, faculty are required to report to their departmental chair and the provost's office all acts of academic dishonesty committed by graduate and undergraduate students. In all such cases, the faculty member should discuss the matter with the student and then make an academic judgment about the student's grade on the work affected by the dishonesty and, where appropriate, the grade for the affected course. The decision as to whether disciplinary proceedings are instituted is made by the provost. Because of the importance of honesty to academic and professional life, acts of dishonesty by graduate students may result in suspension or dismissal from the University.

Graduate students also should be aware that most professional associations have codes of ethics. These codes vary considerably across fields, but tend to provide guidelines for a broad array of professional responsibilities including teaching, research and working with clients. Violations of a code of ethics can lead to negative sanctions by one's professional colleagues and the expulsion from the professional associations in one's field. Graduate students are encouraged to obtain copies of codes of ethics for their chosen profession from the director of graduate studies in their department or program.”

A graduate student must maintain high standards of academic honesty throughout his graduate career, fully in class, teaching and research settings. Finding of academic dishonesty can result in a failing grade in a course and severe academic restrictions that can include probation, loss of PhD candidacy and immediate dismissal of the student from the graduate program.

An example of professional ethical standards required of scientific authors by a major commercial publishing house follows. Elsevier requires authors of papers in its journals to certify that the papers adhere to these standards:

- “be the authors' own original work, which has not been previously published elsewhere
- reflect the authors' own research and analysis and do so in a truthful and complete manner,
- properly credit the meaningful contributions of co-authors and co-researchers,
- be appropriately placed in the context of prior and existing research. “

The Biochemistry faculty endorses the principles of Academic and Professional Honesty above and expects graduate students to abide by them.

**Appendix B**  
**Department of Biochemistry**  
**University of Missouri**  
**FACULTY**

**TENURED AND TENURE-TRACK FACULTY**  
**(\*Doctoral Faculty)**

- \***BEAMER, LESA**, Professor. Ph.D. 1991, Johns Hopkins School of Medicine. Structural biology: X-ray crystallography of medically important proteins. (573) 882-6072. 105A Schlundt Annex.
- \***CHAPMAN, MICHAEL S.**, Professor, 1087, Chair, PhD, University of California, Structural Biology: Viral-Host Interactions and Enzyme Dynamics. (573) .882-9825. 234C Schweitzer Hall.
- \***CORNISH, PETER**, Associate Professor. PhD 2005, Texas A&M University. Dynamics and assembly of ribonucleoprotein complexes utilizing NMR and single molecule FRET. 573-882-0443. 240 Schweitzer Hall.
- \***DEUTSCHER, SUSAN L.**, Professor. Ph.D. 1985, St. Louis University Medical School. Combinatorial approaches to cancer therapies; antibody-nucleic acid interactions and their role in autoimmune disease. (573) 882-2454. 234C Schweitzer Hall.
- \***EMERICH, DAVID W.**, Professor, Associate Chair and Director of Undergraduate Education. Ph.D. 1977, University of Wisconsin. Enzymology and physiology of biological nitrogen fixation and related metabolic activities in bacteria and plants. (573) 882-4252. 245A Schweitzer Hall.
- \***FOLK, WILLIAM R.**, Professor. Ph.D. 1970, Stanford University. Gene expression and DNA replication in eukaryotes and DNA tumor viruses; Expression of tRNAs in plants. (573) 882-4857. 202 Schlundt Annex.
- \***HANNINK, MARK**, Professor. Ph.D. 1987, University of California, San Diego. Biological and biochemical functions of cellular oncogenes, with emphasis on *c-rel*. (573) 882-7971. 440E Bond Life Sciences Center.
- \***HEESE, ANTJE**, Associate Professor. Ph.D. 1997, Michigan State University. Role of membrane trafficking in plant innate immunity. (573)882-3831. 219 Schweitzer Hall.
- \***HENG, XIAO**, Assistant Professor. Ph.D. 2010, University of Maryland-Baltimore. NMR investigations of RNA structures, particularly from Hepatitis C and HIV-1, and their roles in regulation. (573) 882-3953.141 Schweitzer Hall
- \***KOO, ABRAHAM**, Assistant professor, Ph.D. 2004, Michigan State University. Small molecule-mediated defense cell signaling during biotic stress responses and plant lipid metabolism. (573) 882-9227. 127 Schweitzer Hall.
- \***LUBAHN, DENNIS B.**, Professor. Ph.D. 1983, Duke University. Biochemical genetics of the estrogen receptor. (573) 884-6781. 110A Animal Science Research Center.
- MARTIN, MARK E.**, Associate Professor. Ph.D. 1985, University of Mississippi Medical Center. Eukaryotic gene expression; polyomavirus gene expression. (573) 882-5654. 11A Schlundt Annex.
- \***MAWHINNEY, THOMAS P.**, Professor. Ph.D. 1977, Albany Medical College. Analysis of exocrine secretions; development of analytical methodologies. Medical Education. (573) 882-2608. 4 Ag. Bldg.
- \***MCCLURE, BRUCE A.**, Professor. Ph.D. 1987, University of Minnesota. Gametophytic self-incompatibility systems in plants. Biochemistry of gene expression in plants. (573) 882-3932. 240A Bond Life Sciences Center.
- \***PECK, SCOTT**, Professor. Ph.D. 1995, Michigan State University. Proteomics. (573)882-8102. 271H Bond Life Sciences Center.
- PECULIS, BRENDA A.**, Associate Professor, Ph.D. 1991, Johns Hopkins University. Ribosome biogenesis, pre-rRNA processing; RNA metabolism and stability; RNA:protein interactions (573) 884-1424. 11B Schlundt Annex.

\***PETRIS, MICHAEL**, Professor, Ph.D. 1998, University of Melbourne, Australia. Regulation of copper transport and copper-transporting P-type ATPases in eukaryotes and prokaryotes. (573) 882-9685. 540D Bond Life Sciences Center.

\***PHILLIPS, CHARLOTTE**, Associate Professor. Ph.D. 1987, North Carolina State University, Raleigh, NC. Biochemistry and genetics of collagen metabolism. (573) 882-5122. 135A Schweitzer Hall.

\***QUINN, THOMAS P.**, Professor. Ph.D. 1988, St. Louis University Medical School. Radiopharmaceutical design; protein molecular modeling and molecular graphics. (573) 882-6099. 234A Schweitzer Hall.

**SIEGEL, MARCELLE**, Associate Professor. Ph.D. 1999, University of California at Berkeley. Science Education. (573) 882-9248. 107 Schweitzer Hall.

\***SUMNER, LLOYD W.**, Professor and Director of the University of Missouri Metabolomics Center. Ph.D. 1993, Oklahoma State University. Development and application of large-scale biochemical profiling with a personal emphasis on plant specialized metabolism. (573) 882-5486. 240D Bond Life Sciences Center.

\***TANNER, JACK**, Professor. Ph.D. 1988, Brown University, Biochemistry. Protein Crystallography. (573) 884-1280. 211 Chemistry.

\***THELEN, JAY**, Professor. Ph.D. 1998, University of Missouri-Columbia. Proteomics of seed development and plastid differentiation. (573) 884-1325. 271G Bond Life Sciences Center.

\***TIPTON, PETER A.**, Professor. Ph.D. 1987, University of Wisconsin, Madison. Application of tools and methods of modern mechanistic enzymology to enzyme systems. (573) 882-7968. 204A Schlundt Annex.

\***VAN DOREN, STEVE**, Professor. Ph.D. 1991, University of Illinois at Urbana-Champaign. Multi-nuclear, multi-dimensional NMR determination of protein structure. (573) 882-5113. 37A Schweitzer Hall.

\***WEISMAN, GARY A.**, Professor, Director of Graduate Admissions and Recruitment. Ph.D. 1982, University of Nebraska. Cell biology and nutrition; biochemistry and physiology of purinoreceptors; cystic fibrosis. (573) 882-5005. 540E Bond Life Sciences Center

\***ZHANG, SHUQUN**, Professor. Ph.D. 1994, University of Texas, Austin. MAP kinases in plant defense responses. (573) 882-5837. 371G Bond Life Sciences Center.

\***ZOU, XIAOQIN**, Professor. Ph.D. 1995, University of California, San Francisco. Computational Biology. (573) 882-6045. 117A Dalton Building.

## JOINT FACULTY

### (\***Doctoral Faculty**)

\***BURKE, DONALD**, Professor, Molecular Microbiology and Immunology. Ph.D. 1992, University of California-Berkeley. Biochemistry of ribozymes and RNA aptamers. (573) 882-8989. 471H Bond Life Sciences Center.

**CHEN, SHI-JIE**, Professor, Biological Physics, Ph.D. 1999, University of California, San Diego. Physico-chemical models and computational methods for molecular biology. (573) 882-6626. 302 Physics Building.

**GATES, KENT**, Professor, Chemistry. Ph.D. 1990, Northwestern University. Mechanisms of DNA damage by synthetic and naturally occurring antitumor agents, toxins, and mutagens. (573) 882-6763. 125 Chemistry Building.

**KING, GAVIN, M.** Associate Professor, Ph.D. 2004, Harvard University. Single molecule biophysics. (573) 882-3217. 318 Physics Building

\***MIERNYK, JAN**, Research Molecular Biologist. USDA, Plant Genetic Research Unit USDA, Columbia, MO, Ph.D. 1980, Arizona State University. Protein targeting, co- and post-translational protein modification by phosphorylation, glycosylation, and acylation. (573) 882-8167. 108 Curtis Hall. [officially Adjunct, but operationally joint]

**ROBERTS, R. MICHAEL**, Professor, Animal Sciences, D.Phil. 1965, Oxford University, England. Establishment and maternal recognition of pregnancy. Function and hormonal control of synthesis of secretory glycoproteins by the uterus and the early conceptus. (573) 882-0908. 240B Bond Life Sciences Center.

\***SHARMA, KRISHNA K.**, Professor, Ophthalmology. Ph.D., 1983, University of Mysore, India. Structure-function of ocular proteases and peptide hydrolases; mechanism of cataract development. (573) 882-8478. EC 214 Mason Eye Institute.

\***STACEY, GARY**, Professor, Plant Pathology. Ph.D. 1981, University of Texas. Functional genomics of plant-microbe interactions and plant development. (573) 884-4752. 271E Bond Life Sciences Center.

## **PROFESSIONAL TRACK FACULTY**

### **Instructional Track**

**FREYERMUTH, SHARI**, Associate Teaching Professor, Assistant Dean for Academic Programs, Ph.D., 1991, Duke University. Biochemistry Education. (573) 882-7643. 107 Schweitzer Hall.

**REILLY, THOMAS J.**, Assistant Teaching Professor of Biochemistry, Ph.D., 1994, University of Illinois-Urbana-Champaign. Biochemistry Education. (573) 884-6881. 15 Schweitzer Hall.

**MEHRA-CHAUDHARY, RITCHA**, Assistant Teaching Professor of Biochemistry, Ph.D., 1994, Indian Agricultural Research Institute, New Delhi, India. Biochemistry Education. (573) 884-2762. 122 Bond Life Sciences Center.

### **Research Track**

**ERB, LAURIE**, Research Professor, (Weisman Laboratory). Ph.D. 1993, University of Missouri. Molecular studies of nucleotide receptors. (573) 884-2065. 540F Bond Life Sciences Building.

**LEI, ZHENTIAN**, Assistant Research Professor, Assistant Director, MU Metabolomics Center. Ph.D., Virginia Technological University, (573) 884-3345. Metabolomics Center, 240F Bond Life Sciences Building.

**MOONEY, BRIAN**, Associate Research Professor, Associate Director of Charles W. Gehrke Proteomics Center. Ph.D. 1996, University College Dublin, Ireland. Protein expression and assembly; Metabolic engineering. (573) 884-7374. 214 Bond Life Sciences Center.

**MOSSINE, VALERI**, Assistant Research Professor, (Mawhinney Laboratory). Ph.D. 1988, Institute of Physical chemistry, Acad. Sci. of Ukraine. Multivalent lactulose-amines as inhibitors of prostate cancer metastasis. (573) 882-2608. Room 4, Agriculture Building.

**WHITE, TOMMI**, Research Assistant Professor. Associate Director Electron Microscopy Core Facility. Ph.D. 2007, University of Missouri. Electron Microscopy of biological specimens (macromolecular assemblies, viruses, bacteria and cells) with expertise correlative microscopy and cryo-electron microscopy. (573) 882-8304. W125 Veterinary Medicine Building

## **EMERITUS FACULTY**

**MORRIS, ROY O.**, Professor Emeritus. Ph.D. 1958, University College, London. (573) 882-4845.

**HAGEN, GRETCHEN**, Research Professor, (Guilfoyle Laboratory). Ph.D. 1978, University of Georgia. Control of gene expression by plant growth regulators. (573) 882-7300. 10 Schweitzer Hall.

**O'DELL, BOYD L.**, Professor Emeritus. Ph.D. 1943, University of Missouri. Biochemical and physiological functions of trace elements: Metabolism and bioavailability of trace elements. (573) 882-5197. 220 Eckles Hall.

**POLACCO, JOSEPH C.**, Research Professor. Ph.D. 1971, Duke University. Plant cell genetics; assimilation of fixed nitrogen by legumes, Univ. Federal do Rio Grande do Sul Av. Bento Gonçalves.

**RANDALL, DOUGLAS D.**, Professor Emeritus. Ph.D. 1970, Michigan State. Plant metabolism, plant signal transduction, protein kinases and phosphorylated proteins. (573) 882-4847. 223 Schweitzer Hall.

**SCHMIDT, FRANCIS J.**, Professor. Ph.D. 1973, University of Wisconsin. Nucleic acid biochemistry; RNA processing; bacterial antibiotic resistance. (573) 882-5668. 103A Schlundt Annex.

**SUN, GRACE**, Professor. Ph.D. 1966, Oregon State University. Receptor-mediated signal transduction pathways in cerebral ischemia; molecular mechanism of alcoholism. (573) 882-5377. 135C Schweitzer Hall.

**TSIKA, RICHARD**, Professor. Veterinary Biomedical Sciences, Ph.D. 1987, University of California-Irvine. Transcriptional regulation of muscle genes; Transcription factors. (573) 884-4547. 440D Bond Life Sciences Center

### **JOINT EMERITUS FACULTY**

**HILLMAN, RICHARD E.**, Professor Emeritus of Child Health. M.D., Ph.D., Yale University. Inborn errors of amino acid metabolism in humans. (573) 884-7594. NW507 Medical Sciences Building.

**VOLKERT, WYNN A.**, Professor Radiology. Ph.D. 1968, University of Missouri. Radiopharmacy and nuclear medicine. (573) 882-4732. 330 Hadley Hall.

### **ADJUNCT FACULTY**

**EDWARDS, JANICE WETTSTEIN**, Adjunct Professor. Ph.D. 1986, University of Chicago. Director, Biotechnology, Nutrition & Consumer Sector, Monsanto Co. (314) 694-7742. 800 Lindbergh Blvd., St. Louis, MO 63167.

**GRUYS, KENNETH**, Adjunct Professor. Ph.D. 1984, University of Nebraska-Lincoln. Plant biotechnology. Monsanto Company, Calgene Campus, 1920 Fifth Street, Davis, CA 95616. (530)792-2213.

**OULMASSOV, TIM N.**, Adjunct Assistant Professor. Ph.D. 1990, Institute of Molecular Genetics, Moscow, Russia. Plant Biotechnology. (314) 694-2101. Monsanto, 800 North Lindbergh, St. Louis, MO 63198

**SAMUDZI, CLEOPAS**, Adjunct Assistant Professor. Ph.D. 1990, University of Pittsburgh. Northwest Missouri State University, 800 University Drive, Maryville, MO 64468.

**TILLITT, DONALD E.**, Adjunct Assistant Professor. Assistant Chief Chemist at U.S. Fish and Wildlife Service, Ph.D., 1989, Michigan State University. Biochemical indicators of contaminant stress in fish and wildlife (573) 875-5399. U.S. Fish & Wildlife Service, Rt 2, 4200 New Haven Rd, Columbia, MO 65201.

## Appendix C Travel Award

### DEPARTMENT/DIVISION OF BIOCHEMISTRY GUIDELINES FOR DEPARTMENTAL SUPPORT OF GRADUATE STUDENT TRAVEL

1. The Department of Biochemistry provides funds to support graduate student travel with the aim of enhancing research and training. This is to supplement the funds provided by the faculty advisor.
2. Departmental support will be awarded for travel for a) attending a professional meeting at which the student is presenting a talk or a poster, b) attending a professional training course, c) collaborative research or d) other purposes directly related to research and training.
3. All graduate students who successfully pass their comprehensive exam and are in good standing will have available to them up to \$1,500 for travel. The intent of these Departmental funds is to encourage the students to attend several meetings; thus post-comprehensive exam students can apply for departmental support (up to \$500-\$1,000 per trip) to be used to attend 2 - 3 meetings approximately one year apart. Because travel costs are significantly higher to attend international meetings, requests for more than \$1,000 will be considered, on a case-by-case situation. The request for additional funds must be justified by the student on the application.
4. Biochemistry funds should supplement funds provided by the advisor, thus each application must list the approximate funds contributed by the advisor and be signed by the advisor (electronic signatures on PDF documents are preferred). The MoCODE to which the funds for travel will be deposited must be provided. Funds are transferred to the MoCODE to which the travel will be charged.
5. The request process requires both completion of the application form and submission of the abstract of the work to be presented at the meeting. The application and abstract must be submitted a minimum of **30 days** in advance of the start of travel. "Late/last minute" requests may not be considered. Completed electronic application forms should be emailed to **both** the current DGS for approval signature and to the departmental fiscal office, [mubchemfiscaloffice@missouri.edu](mailto:mubchemfiscaloffice@missouri.edu).
6. Decisions to fund applications are not competitive between students. However the amount and the frequency of the requests will be based on evaluation of the merits of the request by the Director of Graduate Studies in consultation, as necessary, with the departmental Chair and on the basis of available funds.

*The electronic application can be found online at <http://www.biochem.missouri.edu/docs/travel-support-application>.*

## Appendix D

# **LABORATORY SAFETY TRAINING - Biochemistry**

See back for Maps and helpful numbers/links

- Location of fire alarms, fire extinguishers, emergency exits. (area map on back)
- Location of emergency showers/eyewashes – Skin contact with chemicals/radiation. (area map on back)
- How to respond to a fire, tornado, earthquake, medical, biological, chemical or radiation emergency. (Orange Emergency Procedures poster)
- How to respond to alarms, including practice drills, severe weather procedures. Tornado watch vs warning. (Fire Alarms, Alertus beacons, equipment alarms, etc.)
- Encourage registration MU Alert. (see <http://mualert.missouri.edu/> )
- How to respond to total utility failures – electrical, freezers. HVAC (campus facilities if emergency/afterhours 882-8211, in all cases contact building coordinator listed on back).
- Handling and use of hazardous chemicals, labeling, storage. (formal training <http://ehs.missouri.edu/train/index.html> )
- How to dispose of hazardous waste – chemical, biological, radiation (Bioboxes Room 7 Schweitzer).
- Housekeeping issues – trash, cleaning of laboratories, recycling.
- Use of departmental facilities – autoclave, water systems, glassware washers, breakroom.
- Use of personal protective equipment – when required and when recommended.
- Security and use of radioactive material rooms. If you see someone who may not belong, ask questions or report the observation to the MU Police Department (573) 882-7201.
- Use of telephones, computers (both university owned and personal...NO TEXTING WHILE WALKING, be considerate of others, stop and step to the side).
- If you are injured while working for MU, report to the University Work Injury Services (GL-12 in University Hospital) during normal working hours. Otherwise, report to Urgent Care or the University Hospital Emergency Center.
- Lab Specific: Use of fume hoods, biological cabinets, how to conduct specific procedures for experiments, safe use of laboratory equipment, and rally point in times of evacuations.

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Employee Signature

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Briefer Signature

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*Employee Printed Name*

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*Date*

## **APPENDIX E**

### **Code of Professional Conduct**

(adapted from the **University of Missouri School of Medicine** update from May 17, 2017)

#### **CODE OF PROFESSIONAL CONDUCT**

The University of Missouri values collaboration and collegiality, respect for others and a commitment to diversity. We hold in high regard professional behaviors and attitudes, including altruism, integrity, and the pursuit of excellence. We assert that effective learning is best fostered in an environment of mutual respect between teachers and learners, in which teachers are role models and set the tone for learners. Accordingly, teachers are held to a high standard of conduct and professionalism.

#### **GUIDING PRINCIPLES:**

**Duty:** Educators have a duty to convey the knowledge, skills, values and attitudes required for advancing the medical profession's mission of health and social contract with its patients. Learners have a duty to be diligent, making the most of each opportunity provided them.

**Integrity:** Our learning environment must be conducive to the conveying of professional values. Undergraduate and Graduate students learn professionalism by observing and emulating role models who demonstrate an authentic commitment to professional values and attitudes. This environment requires that all teachers and learners possess honesty and integrity of character, and genuinely abide by this code of conduct.

**Respect:** Respect for oneself, others and the truth is fundamental to the ethic of medicine. Learners must demonstrate respect for their teachers. Teachers must demonstrate respect for their learners, and acknowledge that they have a special obligation to avoid mistreating them. All teachers and learners must respect staff and administrators.

**Inclusivity:** Ours is an inclusive learning environment that values the varied and different identities of its members. Each and every person has a dynamic identity informed by a lifetime of experiences. Learners and teachers should act to understand and learn from these unique perspectives.

#### **RESPONSIBILITIES OF TEACHERS AND LEARNERS**

##### **Teachers should:**

- Act in a professional manner at all times including being prepared and on time
- Always be honest, possess integrity, and model compassion for others
- Treat all individuals fairly and respectfully
- Sympathize with the choices and life circumstances of others
- Value diversity, and respect each individual's opinions, attitudes, beliefs and values
- Provide quality education for students
- Provide explicit learning and behavioral expectations early in a course or rotation
- Provide timely, focused, and objective feedback on a regular basis, and provide thoughtful and timely evaluations at the end of a course or rotation
- Demonstrate a commitment to life-long learning and professional development
- Utilize questioning which stimulates learning and self-discovery, and avoid aggressive questioning which is intended to be hurtful, humiliating, degrading or punitive
- Appreciate and attend to feedback from students regarding their educational experiences, receiving it without defensiveness, and being willing to consider and incorporate it
- Encourage students who experience mistreatment or who witness unprofessional behavior to report the facts immediately
- Recognize and interrupt hurtful language or unprofessional behavior whenever it is witnessed, and report witnessed to the Director of Graduate Studies or the Departmental Chair.
- Administer all educational activities without discrimination based on race, religion, national origin, age, sex, sexual orientation, veteran status, handicapped status or disability as required by law.

## **RESPONSIBILITIES OF TEACHERS AND LEARNERS, continued**

### **Students should:**

- Demonstrate professionalism at all times including being prepared and on time
- Always be honest, possess integrity, and model compassion for others
- Treat all individuals fairly and respectfully
- Sympathize with the choices and life circumstances of others
- Value diversity, and respect each individual's opinions, attitudes, beliefs and values
- Recognize that students take primary responsibility for one's own learning
- Be active, enthusiastic, curious learners
- Recognize that not all learning stems from formal and structured activities
- Demonstrate a commitment to life-long learning and professional formation
- Recognize personal limitations and seek help as needed
- Solicit performance feedback and welcome constructive criticism, receiving it without defensiveness, appreciating it, and being willing to consider and incorporate it
- Engage in all educational activities without discrimination based on race, religion, national origin, age, sex, sexual orientation, veteran status, handicapped status or disability as required by law.

### **Relationships between Teachers and Students**

Students and teachers must recognize the special nature of the teacher-learner relationship which is in part defined by professional role modeling, mentorship, and supervision.

Because of the special nature of this relationship, students and teachers must strive to develop their relationship to one characterized by mutual trust, acceptance and confidence. They must both recognize the potential for conflict of interest and respect appropriate boundaries.

### **University of Missouri Graduate Studies Policy**

<http://gradstudies.missouri.edu/professional-development/build-your-skills/teach-mentor-preparing-faculty/intimate-relationships.php>

“Sexual harassment and/or an amorous relationship between a member of the profession and any student for whom he or she has a professional responsibility should be avoided. This applies to all supervisor relationships between professors and graduate assistants, graduate students or undergraduate students as well as relationships between graduate assistants and the students they teach or supervise.

Implicit in the idea of professionalism is the recognition by those in positions of authority that in their relationships with their students there is always an element of power. It is incumbent upon members of the profession to neither abuse nor seem to abuse the power with which they are entrusted. Relationships between members of the profession and their students are quite imbalanced. Such relationships may have the effect of undermining the atmosphere of trust among students and faculty on which the educational process depends.”

**Helpful numbers:**

**Standing Biochemistry Safety committee: Dr. David Emerich, chair 882-4252**

Marie Dickerson Building Coordinator dickersonm@missouri.edu 217-248-3358
--

Environmental Health and Safety (573) 882-7018

<http://ehs.missouri.edu/>

MU Police Department (573) 882-7201

Campus Facilities (573) 882-8211

<http://www.cf.missouri.edu/>

***\*\*LAB SPECIFIC MAP WITH NEAREST  
EMERGENCY EXITS/ SHOWERS/ EYEWASH  
WOULD GO HERE***

*(e.g. 1<sup>st</sup> floor Schweitzer, 1<sup>st</sup> floor Schweitzer addition, 2<sup>nd</sup> floor Schlundt Annex) \*\**